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Editorial Comment

Clean Food Food containers and wrappers may be conveyers of tuberculosis, typhoid fever, or other pestilential disease.

When one knows that the bakers in his town are required to pass a careful medical examination and knows that the bread is wrapped in the bakery, he has a comfortable feeling that his bread is arriving free from infectious contamination. He does not stop to think of the possibility of a spray of tubercle bacilli, from the lungs of the printer who printed the wrapper, having contaminated the paper before it was applied to the loaf. The same idea applies to every kind of container used for foods which do not require cooking.

Those planning tuberculosis surveys might do well to keep in mind those industries which produce the material for food containers, or those which fashion the material into finished bags or other food recepticals or packages, and direct especial effort toward case finding in such industries' personnel.

The sanitary rooms of such factories should receive particular attention from the inspectors of health departments and effort might well be expended in an endeavor to secure the co-operation of company officials in requiring hand washing by employees before leaving these rooms.

Some communities have discontinued examination of food handlers because of difficulty in securing proper examination, "racketing" of examinations, and various other reasons. This "defeatist" attitude, as Col. Arthur Parker Hitchens typifies it, is as illogical as the abandonment of any necessary function that is difficult to perform, because it requires no effort to do nothing.

If "half a loaf is better than none," half clean bread is better than no clean bread and if half our infectious food handlers are eliminated through health examinations, we will only get half as much infection as if none were eliminated.

Let's keep on using our influence to secure as healthy food handlers as possible and start thinking about food containers, too.

F. W. B.

Blood Groups In Hemoptysis A. V. Bernardo and F. Medina of the Quezon Institute, Manila, P. I., have made some very interesting studies of blood groups in their relation to pulmonary hemorrhage. They found in using 702 normal Filipinos as controls that the percentage of blood group distribution was closely parallel to the group distribution in the 502 tuberculous Filipinos used in their studies. Of these 502 tuberculous individuals, 245 gave a history of hemoptysis.

In these 245 cases they found an incidence of 37 per hundred in group "O", 48 per cent in group "A-B", 51 per cent in group "A", and 63 per cent in group "B". The result of their studies led them to the following conclusions: First, that pulmonary tuberculosis probably does not have any predilection for a particular group; second, that there is a higher incidence of patients with a tendency toward hemoptysis belonging to group "B" than to any of the other blood groups; and third, expressed mathematically, these findings point out that a tuberculous patient, belonging to group "B" has 63 chances out of a hundred to develop hemoptysis, while if he belongs to group "O" he has only 37 chances out of a hundred.

As seen above, these striking findings point out that tuberculous persons in group "B" are more prone to hemoptysis than those in any of the other blood groups. They could find no obvious reason for this. They suggest that there may be a possibility that persons belonging to group "B" have in themselves an inherent degenerative vascular condition that makes them more susceptible to bleeding, or possibly to certain hemorrhagic diseases. To say the least, their study is intriguing, and we suggest that these studies be continued in our own institutions. C. M. H.

In Defense Of Atlanta This defense of Atlanta is not concerned with the invading hosts of the Federal army, under the command of General Sherman, which once besieged and burned this fair Georgia city. It concerns the newly released statistics on the tuberculosis mortality rate. The figures of this recently compiled statistical survey reveal a marked rise in the mortality rate in Atlanta for the year 1938 and the rather alarming rate of 122 deaths per hundred thousand is recorded as compared to the figure of 94 for the previous year, 1937.

An investigation to explain this rise discloses the fact that in previous years the deaths of Atlanta residents occuring in other and remote places have not been included. These deaths have been included in the last census and contribute about an additional seventy-five deaths to the total. The large and ever increasing Negro population in Atlanta is another cause for the high mortality rate from this disease. The Negroes, in addition to their well-known racial susceptibility or lowered resistance, represent a major portion of the under-privileged group; and it is in such groups that the ravages of tuberculosis are the greatest. Finally, it is to be mentioned that the relief aid has bogged down to a considerable extent, and many families have been reduced to a state of marked privation, if not to the ragged edges of a bare sustenance. The role that nourishing food, warm shelter and the reassuring pay envelope play in the prevention, cure and rehabilitation of tuberculosis is only too well known.

All the agencies in Atlanta are doing yeoman service and performing meritorious work. The public spirit is excellent. The recent dismal report from the statistical quarter should, therefore, be viewed with tolerance and understanding. C. H. H.

The "Unknown" Lymphatic Dr. Brian C. Thompson states in the August, 1939 edition of the *Tubercle*, "There is a particular lymph-node of the internal jugular chain, in what I have termed the mid-jugular group which I have observed on seven occasions to become the seat of acute isolated enlargement and caseation, in each case preceded by progressive tuberculosis in the lung apex of the same side. This lymph-node has been shown in the cadaver to drain the dome of the parietal pleura by an afferent lymphatic distinct from those which pass to the supraclavicular lymph-nodes (Rouviere, 1932). Clinical corroboration of a dissecting-room observation is here strikingly afforded."

We have seen three similar cases and in one of them have demonstrated adhesions at the apex through which the Mycobacterium tuberculosis is assumed to have passed from the lung to the cervical lymph gland. The knowledge of this little known afferent lymphatic and its gland is important in the understanding of apical tuberculosis and apical new growth with cervical involvement. The cervical swelling may be the first sign of the pulmonary disease. F. W. B.

Another Torch To Bear

To listen to the patient's chronicle of his or her symptoms, to make a diagnosis and then to prescribe a form or course of treatment, is only a part of the multiple duties of the physician. It does not end—nor perhaps begin—there. Unfortunately, many doctors apparently think so. In addition to being a practicing physician, a scientist and a philosopher, the physician must be a leader, a humanitarian and a good citizen. This public servant should be a paragon of fine citizenship.

Recent years have seen the increasing demand for doctors as public speakers. So, another role is being added to the already heavily laden curriculum. The scientific assembly halls where physicians are meeting in increasing numbers and with increasing frequency, to exchange ideas of mutual interest, to propound new theories, to reveal fresh discoveries, afford an instance where the ability to speak in public is a great asset. After dinner speeches, short informal talks and the formal address, have become a part of the routine of medical conventions.

The doctor, today, is taking an increasingly prominent part in the education—particularly in matters medical—of the public. His voice is being carried over the ether waves (the radio, not the operating room) with greater frequency. In the medical education of the public, nothing is more effective than the presence, the voice, of the doctor. This has been so often, and so strikingly, shown in the tuberculin skin-testing surveys. Skepticism, ignorance and fear, in the magic presence of the doctor, give way to confidence, belief and co-operation.

Short talks or lectures on medical topics over the radio, in the school room, at parent-teacher associations, at church guilds, before women auxiliary societies, etc., have become one of the greatest factors in the forward progression of the healing art. It is most gratifying to see the physicians awakening to this responsibility and, in augmenting numbers, taking their place upon the speaker's platform.

Colleagues, carry on apace. It is your duty. It is your privilege. C. H. H.

The New York Meeting

Every once in awhile something so far out of the ordinary comes along that it outshines all that has been done before in the particular field. We feel that we can claim this distinction for the program arranged for the New York Meeting of the American College of Chest Physicians.

In the way of scientific eminence, complete coverage of the field of chest diseases, practicality and general interest, this program has never been surpassed for the topics with which it deals.

As is usually the case, this achievement rests on a foundation of trial and error and growing importance built by the men who labored with past programs. Yet, we feel that Dr. Ornstein, the Chairman of the Program Committee, and the other men who worked so closely and conscientiously with him are deserving of praise and support.

And while we know that praise was the least of the motivating factors behind these efforts, we also know that the support of the Fellowship of the College will not only be appreciated, but is expected.

We can support this fine program by having present at the New York Meeting a larger percentage of the Fellowship of the College than at any preceding assembly. Let's send in our reservations today! C. M. H.

The complete program of the Sixth Annual Meeting of the American College of Chest Physicians, to be held June 8-10, 1940, at the Biltmore Hotel, New York City, will be published in the May issue of DISEASES OF THE CHEST.

Survivorship Rate on Collapse Therapy Patients Discharged From Sanatoria*

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In combatting tuberculosis, the success of eventual eradication is dependent upon the balanced and continuous interplay of three fundamental forces. These basic activities include (1) diagnosis of early cases, (2) adequate sanatorium care, and (3) medical and social after-care, including rehabilitation. Individual initiative and effort in one field will be fruitless unless supported by cooperative action and integration with the other two parts.

The sanatorium system of caring for the tuberculous is still in a state of development and transition. Of late, new methods of treatment, such as collapse therapy, have been added. Sanatorium care has been augmented by epidemiological investigation, the purpose of which is to discover new facts about the natural history of tuberculosis and, at the same time, to find new cases soon after occurence so that early treatment may be given.

Early diagnosis campaigns are being waged relentlessly throughout the state and country, and rightly so. In some states sufficient sanatorium beds are available to hospitalize all known sufferers of the disease who are willing to take the "cure". This aspect of the fight against the disease shows real accomplishment.

The third link in the chain, after-care and rehabilitation, seems to be the weakest one. It is, however, encouraging to note that during the past few years considerable interest has been aroused in the post-sanatorium mortality of tuberculosis patients. In order to plan wisely for after-care and rehabilitation, accurate statistics must be made available as to the scope of the work, the mortality and survivorship rates, the effects of collapse therapy, and a multitude of other factors involving the discharged patient.

As Frost[1] once stated, mortality experience is the only reasonably accurate measure of the effect of tuberculosis upon a community. Even mortality rates have deficiencies because only a limited number of deaths upon which the rates are based are reported by sanatoria or hospitals. Morbidity rates based upon reports of new cases have too many obvious sources of error to be used as measures of the effectiveness of tuberculosis control. Therefore, when mortality and morbidity data are combined to form a ratio of deaths to new cases, the inherent weaknesses of both statistics become accentuated. This ratio should not be termed the case-fatality rate because only new cases are included in the formation of this ratio, instead of all known cases, which is the procedure commonly used in good statistical practice. In addition, only a small portion of the deaths occurring during the year are among new cases reported that year (excluding those first reported by death certificate only), so such a "new-case fatality" rate is not a valid measure of the annual mortality experience of known cases exposed to the risk of dying.

The annual "new-case fatality" rate of the community is not a measure of sanatorium care because too many uncontrollable variables are at work and have not been measured and evaluated. To mention a few, there is the unsettled question of what a reportable case of tuberculosis is: first infection, reinfection, or both. There is a significant number of cases reported each year by death certificate only. There is a tendency to label a person as dying from tuberculosis, if a diagnosis of that disease has ever been made, regardless of the primary or terminal cause. This finding is born out by post-mortem statistics of patients dying in state institutions. There is evidence that with decreasing crude mortality rates from tuberculosis there has been a shifting of deaths from tuberculosis to the older age groups, where the age specific death rates are higher. The distribution of the general population shows a shift

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to the older age groups, with the result that more persons are exposed to the high risk of dying from tuberculosis, which is true of people of advanced age.

The only impartial method of measuring the results of sanatorium care is to compare two groups of patients of similar age, sex, economic status, stage of disease, and type of collapse therapy, by means of life-table or case-survivorship methods of analysis for a period of not less than five years after the onset of disease or discharge from a sanatorium. One group must have had sanatorium care; the other, no sanatorium care. To find an untreated group with all the necessary data is a herculean task which apparently has not been performed.

In Minnesota's fairly stable population of 2,600,000 people, there has occurred in the last fifteen years a marked decline in the annual tuberculosis death rate per 100,000 persons: from 69.5 in 1924 to 30.6 in 1938. What proportions of this decrease are assignable to early diagnosis, adequate sanatorium care (including collapse therapy), and post-sanatorium rehabilitation is difficult to determine because no common yardstick is available.

The fact that 90 per cent of the patients admitted to Minnesota sanatoria are received in the advanced stage of the disease is sufficient evidence that the early diagnosis aspect of tuberculosis control has not reached its potential highest level of efficiency and, accordingly, cannot be credited with the major part in the reduction of the tuberculosis death rate. The amount of money spent for follow-up and rehabilitation of discharged patients is small in this state, so the reason for the steady decrease in the tuberculosis death rate cannot entirely be found there.

In Minnesota there are fifteen sanatoria and nineteen state institutions with sufficient bed capacity to isolate all known cases of reinfection type tuberculosis wanting care. If for no other reason than because of the isolation provided infective tuberculous persons, it is reasonable to assume that sanatorium care has been a major factor in the decline of the death rate from tuberculosis. Statistically, however, in the light of present knowledge, that statement cannot be proved or disproved.

The purpose of this brief report is to present a method of investigating the survival rates of discharged tuberculous patients, many of whom have been subjected to various forms of collapse therapy while in the sanatorium.

The role of collapse therapy in controlling tuberculosis is an interesting and vitally important subject. A distinction must be made between the immediate and the late results of chest surgery in the treatment of pulmonary tuberculosis. The chest surgeon is primarily interested in the post-operative results of his work, and the life experience of his patients while in the sanatorium. Today, the operative mortality from chest surgery performed by skillful hands has reached an amazingly low rate.

The public health administrator is primarily interested in the survivorship rates of these tuberculous patients with surgical collapse, during the immediate years after discharge from a sanatorium. In addition, he is concerned with what proportion of the total number of tuberculous patients can be benefited by judicious use of collapse therapy. Unless that number is appreciable, the death rate from tuberculosis in the community will not be affected, even though the value of miraculous cures in a few individual cases is unquestioned.

The records of 6,956 verified cases of reinfection type tuberculosis have been investigated, and form the basis of this study of patients discharged from Minnesota sanatoria from 1926 to 1935 inclusive. This group is a random sample of the total number of tuberculous patients discharged during that period.

Of the total patients discharged, 10 per cent were minimal; 28 per cent, moderately advanced; and 62 per cent, far advanced on admission. Only seven per cent of all cases discharged alive could not be traced at least one year.

It is interesting to note that 96 per cent of the minimal, 85 per cent of the moderately advanced, and 42 per cent of the far advanced (on admission) were discharged alive. What an opportunity of saving life tuberculosis specialists would have if the majority of cases entered a sanatorium in the early rather than in the advanced stage of the disease!

In Table I may be seen the distribution of

discharged patients by type of collapse therapy and by National Tuberculosis Association classification. Various combinations of collapse therapy have been used on these patients, including pneumothorax, phrenic operations, pneumolysis, oleothorax, scaleniotomy, and thoracoplasty. However, in order to have reasonable numbers in each category for analysis, three groups were arbitrarily chosen: (1) pneumothorax alone; (2) some phrenic operation alone or in conjunction with pneumothorax; and (3) thoracoplasty cases of one, two, or three stages, with or without phrenic operations or pneumothorax prior to thoracoplasty.

TABLE 1.

Distribution of Discharged Patients by Type of Surgery and NTA Class. For Minnesota Sanatoria—1926 to 1935

		NTA Classification			
		Minimal	Mod. Adv.	Far Adv.	Total
Total Discharged		696	1,914	4,346	6,956
Discharged Alive	No.	668	1,633	1,834	4,135
	%	96	85	42	59
Pneumothorax Alone	No.	22	219	318	559
	%	3	14	17	14
Pneumothorax and Phrenic Operation	No.	21	102	189	312
	%	3	6	10	8
Thoracoplasty alone or after other Surgery	No.	4	49	202	255
	%	0.6	3	11	6
Some Surgery of above three types	No.	47	370	709	1,126
	%	7	23	38	28
Discharged Dead	No.	28	281	2,512	2,821
	%	4	15	58	41
Pneumothorax alone	No.	4	35	223	262
	%	14	12	9	9
Pneumothorax and Phrenic Operation	No.	1	16	125	142
	%	4	6	5	5
Thoracoplasty alone or after other surgery	No.	0	18	57	75
	%		6	2	3
Some Surgery of above three types	No.	5	69	405	479
	%	18	24	16	17

From a practical point of view it is of more concern to determine what happens to all patients who have had some form of collapse therapy than to consider the late results of a group of selected ideal cases most likely to experience successful treatment.

This discussion is not an evaluation of the comparative results of various types of collapse therapy from a surgical point of view. It is a study of the mortality experience of a group of patients who have had collapse therapy while in the sanatorium. It does not include those patients who died in the sanatorium or in the immediate post-operative period. Accordingly, these figures must not be considered as post-operative mortality results of chest surgery.

It is to be remembered that patients on whom collapse therapy is attempted are often a selected group who would be most likely to benefit by such therapy. The mortality experience of such a group, even if collapse therapy were not attempted, should be better than the mortality experience of the general group of patients on whom collapse therapy cannot be done.

Two commonly expressed reasons as to why collapse therapy is not used in many cases of pulmonary tuberculosis are: (1) that many physicians doing tuberculosis work believe sincerely that conservative treatment, consisting of bed rest, good food, and hygienic surroundings, should be tried for a reasonable period before other therapy is attempted; (2) that because of extensive involvement of both lungs and the poor general condition of certain patients, no surgery should be attempted for fear of rapid spread of the disease.

From Table I it can be seen that the number of minimal cases discharged alive after receiving collapse therapy is too small to be used for follow-up study, so the discussion from this point on will be limited to the moderately and far advanced cases.

It is observed that of the 1,633 moderately advanced cases discharged alive, 14 per cent had pneumothorax; 6 per cent, phrenic operations and pneumothorax; and 3 per cent, thoracoplasty; or a total of 23 per cent of these patients discharged alive had one of the above three types of collapse therapy.

In the far advanced group of 1,834 cases

discharged alive, 17 per cent had pneumothorax alone; 10 per cent had phrenic operations plus pneumothorax; and 11 per cent had thoracoplasties done; making a total of 38 per cent of this group who had some of the above types of collapse therapy.

It is pointed out that if the total number, rather than the number alive on discharge was considered, the percentage of persons receiving collapse therapy would be decreased. Careful distinction must be made between the number of patients upon whom collapse therapy is attempted and the number who live to benefit by it.

Of the 281 moderately advanced cases dead on discharge, 12 per cent had pneumothorax; 6 per cent, phrenic operations and pneumothorax, and 6 per cent, thoracoplasty; or a total of 24 per cent.

Of the 2,512 far advanced cases dead on discharge, 9 per cent had pneumothorax; 5 per cent, phrenic operations and pneumothorax; and only 2 per cent, thoracoplasty operations; or a total of 16 per cent had some one of the above types of collapse therapy.

The method of study used in this investigation of collapse therapy cases is a modified form of life table analysis, described in the literature by Frost[1], Brieger[2], and, most recently, Puffer[3]. Consideration is given to the number of persons alive at the beginning of each year after discharge, the number withdrawn and dying during each year, and the average number of persons at risk each year, as seen in Table II, Column 3. By taking the number of cases dying each year as the numerator and the average at risk during the year as the denominator, it is possible to set up the probability of a group of sanatorium patients' dying in any successive year after discharge. By subtracting from 100 per cent the percentage of those who die, one obtains the percentage of those who survive.

Because of the fact that health workers are concerned only with those patients discharged alive who present problems of aftercare and rehabilitation, it seems worth while to consider these cases on the basis of an annual case-survivorship, rather than case-fatality rate. For uniformity it is suggested that we adopt in all future studies the term "annual case-survivorship rate" to describe the mortality experience of patients discharged from tuberculosis sanatoria. This rate is simple to understand and easy to use, and provides a useful yardstick for measuring mortality and survivorship experience.

By using the annual case-survivorship rate for the first year after discharge in conjunction with each annual case-survivorship rate for succeeding years after discharge, one may obtain the percentage of persons surviving through the past and present years, as seen in Table II, Column 6. The number of persons who have been followed up should be large enough so that the rates established have statistical significance.

In making comparisons of annual case-survivorship rates for different groups of patients, many factors must be taken into consideration. It is known that the death rate from tuberculosis varies with age. The tuberculosis death rate is low in the period up to 15 years; jumps to a high level in the period 15 to 25 years; remains rather stationary up to 60 years of age; and thereafter increases in amount. The tuberculosis death rate varies with sex, especially in the young adult group. It is not fair to compare one set of cases comprised mostly of young individuals with another set composed mostly of older persons. Corrections should be made by one of the commonly used statistical technics for differences in distributions, such as age and sex, before comparative analysis.

However, in the study presented, which is only a preliminary report, the age groups and sexes have been thrown together in order to have enough cases to form reasonable rates. All comments regarding the annual case survivorship rates in this group of patients followed up in Minnesota must be qualified by uncorrected factors in the data, such as, sputum findings, extra-pulmonary complications, number and duration of residences, and reason for discharge.

Examination of Table II discloses the fact that during the fifth year after discharge 80 out of every 100 moderately advanced cases who had no surgery were still alive. In other words, a five-year case-survivorship rate of 80 per cent was established. The far advanced cases with no surgery showed a five-year case-survivorship rate of almost 50 per cent. These figures are not directly comparable because the two groups of cases rep-

resented have not been corrected for variable factors previously mentioned. However, it appears that, with such a large difference in the case-survivorship rates, it is unlikely correction factors would completely wipe out the significance of the findings. Some of the survivorship rates from English investigations[4] for the first two decades in the twentieth century show only 50 per cent of the moderately advanced and 20 per cent of the far advanced alive five years after discharge.

It was observed that the five-year survivorship rate of moderately advanced cases who had pneumothorax alone was 88 per cent of those with phrenic operations with or without pneumothorax, 75 per cent; of those with thoracoplasty alone or in combination with other surgery, 77 per cent.

Among the far advanced cases who had pneumothorax alone, the five-year case survivorship rate was 77 per cent; in the cases with phrenic operations, with or without pneumothorax, 70 per cent; in the patients with thoracoplasty alone or in combination with other surgery, 74 per cent. These rates are all higher than the survivorship rate of 54 per cent for far advanced cases with no surgery. If further careful analysis bears out these findings, collapse therapy will have made definite strides in the control of the disease.

Statistical conclusions regarding the number of lives which have been saved and the number of cases arrested and rendered noninfective by means of collapse therapy cannot be given because the number of cases is not large enough to correct for important variables. Differences, however, do indicate that collapse therapy can make a real contribution in the reduction of tuberculosis mortality in patients after discharge when it is recalled from Table I that 23 per cent of the moderately advanced and 38 per cent of the far advanced patients discharged alive had the benefit of some of the above-mentioned types of collapse therapy.

Comments

As stated in a recent review[4], the literature from 1885 up to the time of this study in 1926 has shown that a person with minimal tuberculosis had his risk of dying increased approximately four times; the moderately advanced, 16 times; and the far advanced, 40 times over that of persons in the general population from which these patients were drawn. Recent studies[5], based on Minnesota data give evidence that in the period from 1926 to 1935 the minimal case's risk of dying was increased only twice; the moderately advanced, five times; and the far advanced, nine times over that of persons of similar age in the general population. Although these figures are not directly comparable with the ones of prior years, because of the lack of controlled variables, it is interesting to note that during the last decade the trend seems to be markedly downward.

The question may be raised as to whether or not it is early diagnosis and treatment that brings about the reduced risk or whether or not the reduced risk is inherent to the stage of the disease that exists at the time. It may be both.

Systematic follow-up after discharge, including provision for the necessities of life for tuberculous patients, could reduce the number of deaths and result in the prevention of the spread of tuberculous infection and disease to members of the patients' families. The need for universal provision of adequate medical supervision of discharged tuberculous patients is one of the greatest lessons learned from a careful perusal of figures on survivorship of discharged patients.

Data on the mortality or survivorship rates of discharged patients cannot be used as a yardstick to measure the results of sanatorium treatment. This can be done only by comparing two groups of tuberculous patients, one with and the other without sanatorium care. Annual case survivorship rates should prove invaluable as a sound foundation for the development of an after-care and rehabilitation program which would take into consideration the condition of the patient on discharge and his chance of surviving during the immediate period thereafter. A thorough knowledge of post-sanatorium mortality is a prerequisite of sound rehabilitation planning.

The sanatorium alone cannot solve the problem of the control of tuberculosis. If this costly, contagious disease is to be eradicated, there must be continuous bombardment along three fronts: (1) diagnosis of early cases; (2) adequate sanatorium care; and

TABLE II.

Annual Case Survivorship Rate of Patients Discharged From Minnesota Sanatoria 1926-35

	Year After Discharge	No Surgery						Pneumothorax Alone						Phrenic Operation With or Without Pneumothorax						Thoracoplasty Alone or in Combination With Other Surgery					
		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
Moderately Advanced	0-1	1149	21	1138.5	54	95.3	95.3	210	6	207	9	95.7	95.7	99	4	97	7	92.8	9.28	48			3	93.7	93.7
	1-2	1074	43	1052.5	55	94.8	90.3	195	8	191	6	96.9	92.7	88	8	84	2	97.6	9.06	45	3	43.5		100.0	93.7
	2-3	976	93	929.5	38	95.9	86.6	181	29	166.5	2	98.8	91.6	78	25	65.5	3	95.4	8.64	42	6	39		100.0	93.7
	3-4	845	111	789.5	22	97.2	84.2	150	32	134	1	99.3	91.0	50	13	43.5	3	93.1	80.4	36	8	32	1	96.9	90.8
	4-5	712	97	663.5	24	96.4	81.2	117	30	102	1	99.0	90.1	34	11	28.5	2	93.0	74.8	27	6	24	1	95.8	87.0
	5-6	591	81	550.5	11	98.0	80.0	86	23	74.5	2	97.3	87.7	21	9	16.5	0	100.0	74.8	20	6	17	2	88.2	76.7
Far Advanced	0-1	1027	26	1014	220	78.3	78.3	310	6	307	22	92.8	92.8	181	4	179	16	91.1	91.1	194	2	193	9	95.3	95.3
	1-2	781	34	764	121	84.2	65.9	282	9	277.5	13	95.3	88.4	161	5	158.5	11	93.1	84.8	183	9	178.5	6	96.6	92.1
	2-3	626	61	595 5	57	90.4	59.6	260	31	244.5	14	94.3	83.4	145	26	132	7	94.7	80.3	168	38	149	8	94.6	87.1
	3-4	508	64	476	29	93.9	56.0	215	39	195.5	9	95.4	79.6	112	42	91	6	93.4	75.0	122	33	105.5	4	96.2	83.8
	4-5	415	62	384	30	92.2	51.6	167	41	146.5	4	97.3	77.5	64	25	51.5	2	96.1	72.1	85	20	75	2	97.3	81.5
	5-6	323	63	291.5	12	95.9	49.5	122	33	105.5	1	99.1	76.8	37	17	28.5	1	96.5	69.6	63	18	54	5	90.7	73.9

N. T. A. Classification.

1—Present at beginning of year.

2—Withdrawn during year.

3—Average at risk during year.

4—Number dying during year.

5—Percentage surviving through year.

6—Percentage surviving through past and present years.

(3) medical and social after-care of tuberculous patients discharged from sanatoria.

Summary

1. Post-sanatorium mortality statistics for patients discharged from Minnesota sanatoria during the years 1926 to 1935 are presented.

2. The records of 6,956 verified cases of reinfection type tuberculosis form the basis of this preliminary study on the post-sanatorium experience of discharged tuberculous patients.

3. Of the total patients discharged, 10 per cent were minimal, 28 per cent moderately advanced, and 62 per cent far advanced on admission.

4. Of the total cases discharged, 96 per cent of the minimal, 85 per cent of the moderately advanced, and 42 per cent of the far advanced (on admission) were discharged alive.

5. A modified form of life table analysis was used in studying the group of cases who did not have collapse therapy and the three groups who had collapse therapy; the moderately advanced cases who had no surgery had a five-year case survivorship rate of 80.0; those with pneumothorax, 87.7; those with phrenic operations, 74.8; and those with thoracoplasty, 76.7. The far advanced cases who had no surgery had a five-year case survivorship rate of 49.5; those with pneumothorax, 76.8; those with phrenic operations, 69.6; and those with thoracoplasty, 73.9.

6. Adequate sanatorium care must be provided for persons with reinfection type tuberculosis if they wish to arrest their disease and continue to live.

7. There is urgent need for continuous medical and social after-care and rehabilitation of discharged patients in order to carry on the good work started in the sanatorium.

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The Role of the General Practitioner in Pulmonary Tuberculosis

Diagnosis and Treatment *

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The backbone of the fight against tuberculosis is the family doctor. His is a much more important part than that of the specialist, not only for prevention and early diagnosis, but also for home treatment and after-care.

Three measures of direct attack are his:

1. Case-finding intensified to the highest possible degree.

2. Isolation and treatment of open cases at the earliest possible moment.

3. Surveillance of families in a continuous and systematic manner.

In applying this program to the family there is implied extensive pulmonary examination and subsequent periodic check-ups for all its members.

Individuals can conveniently be grouped into three classes; those with:

1. Tuberculous infection recognizable by the tuberculin test.

2. Tuberculosis recognizable by radiographic examination only.

3. Tuberculosis clinically manifest.

For practical purposes, this enables us to distinguish between (a) normal families, that is, those with infection recognized by the tuberculin test, but with no lesions demonstrable by x-ray, (b) families with closed or unsuspected tuberculosis, recognizable by

* A continuation of Dr. Max Pinner's paper, published in the preceeding issue. Read before the Bronx County Medical Society as part of a Symposium on the Role of the General Practitioner in Pulmonary Tuberculosis, November 15, 1939.

x-ray only, and (c) families with active or open lesions, clinically manifest.

In the course of his *first periodic health examination* of the family members, the general doctor should find all cases of tuberculosis as well as suspects; should endeavor to obtain a complete history of tuberculosis in the antecedents; should obtain roentgen films of the chest of all adults and adolescents; should perform tuberculin tests on all members. As infection takes place commonly during childhood, the tuberculin test should be made routinely at definite intervals from infancy on. In short, the investigation should immediately reveal, not only all cases of tuberculosis including the open or momentarily closed ones (regardless of whether they are active or stationary and symptomless), but should also bring under scrutiny all cases suspected of harboring tuberculous lesions. Negative reactors to tuberculin are to be retested every year for determining the development of infection. A newly developed positive tuberculin test indicates recent infection and careful watching. Tuberculin reactors with negative x-rays should be re-x-rayed annually.

Families with open cases will naturally require not only immediate medical care, but also continued surveillance after arrest, to prevent their future re-opening as cases of phthisis. Continued exercise of measures to prevent reinfection of infected contacts, as well as to avoid exposure of young children is indicated. These objectives can be achieved only by carrying out a strict routine of isolating open cases until they close, by frequent periodic re-examination of the recovered patient, and frequent periodic clinical-roentgenological studies of other members of the family.

The intensity of these measures may relax in accordance with the incidence of manifest lesions or infection present.

By efficient pursuit of this program, effective control of tuberculosis in the family will accrue. The success of the campaign will be directly measurable by the elimination of unsuspected phthisis in members of the family. The success of the physician's preventive campaign will be determined by his ability to keep at a minimum the cases of tuberculous infection associated with clinical manifestations. He must prevent:

1. Development of phthisis unexpectedly in an unsuspected member of the family.

2. Development of clinically manifest primary infection, that is, infection capable of producing disease due to direct and massive exposure.

The prevention of exacerbation of a tuberculous lesion, or even of the progression of infection to the stage of disease cannot, to be sure, be completely effected by the family physician. However, through his painstaking investigation, the physician should be immediately aware of all those harboring lesions of disease-potentiality, and if a case of phthisis does appear, it will not occur in one hitherto unsuspected.

Early Diagnosis

For the general practitioner the early diagnosis of pulmonary tuberculosis should not be difficult. Knowledge of certain facts helps make the diagnosis simpler. A *history* of known exposure to tuberculosis is valuable, although the absence of such history proves little. *Symptoms* and *physical signs* are usually absent at the start, or slight, until the disease is well advanced. Examination of the sputum does not usually reveal tubercle bacilli until the lesion is well advanced. We must seek tuberculosis among the apparently healthy people if we are to treat the disease most successfully. By the *tuberculin test* we can often detect tuberculosis within three weeks after the bacilli have entered the body and the primary complex has begun to develop. Fifty to seventy per cent of adults in rural districts may be free of this primary infection. In general, pulmonary tuberculosis is not the result of primary infection. Reinfection, on the contrary, appears to be the usual cause of tuberculosis, whether that reinfection comes from within or without. The primary infection in the child is resisted so well that, usually, it requires no treatment.

The most important means of early diagnosis is the *x-ray*. This, however, must be properly taken and properly interpreted, preferably by an experienced roentgenologist or tuberculosis expert. The x-ray shadows may exist even a few years before symptoms develop.

In the presence of abnormal x-ray shadows,

how shall we decide that they signify active tuberculosis? Even in the absence of symptoms, examination of any sputum whatsoever and of gastric contents is indicated for the finding of tubercle bacilli.

A single x-ray may indicate that the lesion represents active tuberculosis, by the soft and hazy appearance of the shadow, with absence of clear-cut outline; by the obvious presence of caseous tuberculosis of enlarged tracheobronchial lymph nodes; and by the presence of an annular shadow representing cavity. But generally, serial x-rays, compared over a period of time, are needed to decide activity of the disease. Unchanging shadows over a period of about six months, in the absence of symptoms of clinical activity, indicate arrested disease. A widespread amount of disease, as shown by the x-ray, can exist without representing active tuberculosis, just as the smallest amount tucked away in an apex may represent a very active disease.

Abnormal physical signs may be conspicuously absent in active tuberculosis particularly in the early infiltrate. Except for the signs of a cavity, abnormal signs do not necessarily indicate active tuberculosis, but the development of physical signs in a new area on re-examination strongly suggests active tuberculosis. Rales are not uncommonly present in healed fibrotic disease. Early disease does not imply limited disease, especially in adolescence. Spread is often rapid, even to the extent of half a lung within a few weeks of onset.

Positive *sputum* is the ultimate test in the diagnosis of active tuberculosis and should be assiduously sought for by repeated study of stained smear of sputum, as well as by concentration methods, studies of cultures and guinea pig inoculations. Examination of the patient's saliva will often deceive us by supplying a negative return from the laboratory, but even the frightened patient who swallows the sputum may often be outwitted by an examination of gastric lavage, or, on rare occasion, even of the stools. Elevated *blood sedimentation* rate may point to active disease, although it is not necessarily elevated in all active cases; similarly so with a shift to the left in the *polynuclear index*, so that the young forms of polynuclear cells are abnormally increased.

Subjective evidences of activity, often oversearch and questioning, such as: elevation of temperature, rapid pulse, fatigue, rundown state, poor appetite, indigestion, loss of weight and pleurisy. The more obvious symptoms are cough, expectoration, manifest fever and blood-spitting. However, the absence of these symptoms does not preclude a diagnosis of active disease.

Hemoptysis does not necessarily indicate activity, as it may come from an obsolete lesion, especially a bronchiectasis; but its presence always indicates a period of study and observation.

Newly Detected Minimal X-ray Lesions Without Manifest Symptoms

A most difficult problem, not only for the general doctor, but often for the specialist, is the proper management of the newly detected x-ray lesion, usually found in the upper third of the lung without accompanying symptoms. Proper diagnosis first is necessary, discriminating between those lesions that need treatment and those that do not. In the majority of persons, minimal upper lobe lesions without accompanying symptoms represent residual images of old tuberculous infections that are healed and need no treatment. In a certain proportion, they represent a so-called latent disease which possesses the potentiality of progression and requires treatment. The *obsolete residual images* are usually found in an adult and have characteristic x-ray features. In these images, the lesion is usually bilateral, multiple in distribution, apical or sub-apical in localization and appears nodular or string-like and partially or completely calcified. The *latent lesion* that requires treatment is not always easily distinguished from the obsolete, but its x-ray appearance is often as a single nodule in the upper third of the lung, or between the hilum and the clavicle; isolated and less distinct in outline; and suspiciously resembling the initial focus of chronic progressive pulmonary tuberculosis. It can be exudative, caseous or fibrotic; (it is rarely calcified). Its presenting sign may even be a pleurisy which is detected on the x-ray without obvious accompanying pleuritic symptoms. Latent disease may also appear as enlarged hilum lymph node tuber-

culosis, although caseous enlargement of such tracheo-bronchial nodes can be positively identified only when some part of their oval outline can be defined approaching the median lung field. The opinion of many roentgenologists that such tuberculosis of the tracheo-bronchial lymph nodes can be recognized by increased density of the shadow at the hilum, or by thickening of the mediastinal shadow, is in practice misleading.

Age and sex and recency of infection, especially in contacts, may strongly point the trend of these shadows. The younger the individual, especially with the adolescent female, and the more recent the infection, as evidenced by a history of recent exposure, and especially by the presence of a newly developed tuberculin response, the less the likelihood of obsolescence. The progression of these x-ray shadows is more likely to take place in men beyond 20 years of age; but, before that in women. Racial predisposition, poverty, ignorance, malnutrition and employment in the unskilled and dusty trades may point the trend of progression of these lesions.

In contrast to these two forms of tuberculosis without symptoms is the *manifest active disease*, accompanied by symptoms which of course requires immediate treatment. This is usually of exudative nature, less commonly a productive disease, and located generally in the upper third of the lung, although no part is exempt. It appears either of considerable size at the start, or as groups of small nodules of productive tuberculosis which continue to progress and become confluent. Recent manifest exudative tuberculosis, especially in young women, can be most serious. It relates more to younger ages. There is a likelihood of its rapidly liquefying to cavity formation and spreading through the bronchi. Fibrotic and calcified lesions are of less serious significance, although it must be remembered that fresh calcifications may still contain caseous material and their breakdown occasionally occurs. The chronic fibrotic and less progressive disease relates more to middle life.

Treatment

In *obsolete healed lesions*, no difficulties are encountered in management. In *latent lesions*, suspected to be active, the difficulties of management are encountered. Generally, the closest of continued observation and scrutiny are necessary until such time as the lesion is definitely recognized as obsolete. Postponement of treatment pending a period of observation is only justifiable when the lesion is definitely recognized to be stable and fibrosed. Where symptoms are lacking or vague, the pulmonary infiltration, although small, is potentially dangerous. In every case treatment should be prompt and strict and observation made at frequent intervals, at first with an x-ray and close clinical study every two to three weeks, until the stability of the lesion is known. Even with no sputum present, examination of the fasting stomach contents obtained by lavaging in the morning should be carried out as part of the clinical study. After the apparent stability of the lesions is known, they should be followed with x-rays for many years; about every three or four months at the start and, always, at least once a year.

What should be the general practitioner's part in treatment of the *manifest* form of *active tuberculosis?* There is no reason for him not continuing to take an active part in the management of the patient with active tuberculosis after the diagnosis is established. Accordingly, he must fully appreciate certain fundamentals. First, the earlier appropriate therapeutic measures are applied, the sooner the patient ceases to be a menace; and, in most cases, prognosis becomes proportionately more favorable. Manifest active tuberculosis is immediately treated with absolute bed rest. The question of a more active form of therapy is to be given immediate thought. Therefore, certain concepts of the treatment of pulmonary tuberculosis should be familiar to the general doctor: that the infiltrative form of the disease often responds to bed rest under the proper regime; that more active treatment be considered at once where cavity exists; that, although certain types of small cavities often close without collapse treatment, still such results are exceptional rather than the rule; that not all cavities call for pneumothorax treatment, but that stabilized strictly apical cavities, not below the 2nd rib, may at times indicate immediate apical thoracoplasty rather than prolonged pneumothorax: that

unsuccessful collapse therapy of adherent cavity should not be continued because of serious hazards of dissemination of disease, rupture of lung and empyema.

Relation to Public Health Agencies

The family doctor can render great aid by recognizing patients that require immediate hospitalization, because of poor home conditions, especially in the presence of children, or because of the severity of the disease. If means of segregation are not available, urging the patient to seek proper clinics or other sources for collapse treatment, is required. Collapse treatment is certainly possible at home, either while the patient is awaiting sanatorium admission, or under other circumstances. By this means the sputum is rendered free of tubercle bacilli and the disease is controlled, so that hospital or sanatorium care may not be needed.

While the patient awaits admission to a sanatorium, the physician instructs him as to precautionary measures. Consultation clinics of the city are always available to the family physician, where the closest cooperation is afforded him, not only for aid in diagnosis, but also in treatment. City tuberculosis hospitals and country sanatoria likewise, to which he may refer patients for active treatment and from which he should receive them on their discharge, are at his disposal.

In the management of patients requiring pneumothorax treatment, the general physician should not divorce himself from the case even though the collapse therapy is carried out by a specialist. This is particularly necessary because he, after all, is the one to handle the patient and the family in the many years of after care. It goes without saying that, should the family doctor have had special training in pneumothorax therapy so that he himself is capable of carrying this out, the treatments should not be given without the aid of a fluoroscope or x-rays.

In the after-care of his patients, he is to realize the great importance of routine reexaminations, including x-rays and sputum studies, especially at the start of return to work, with the frequency of about once a month and later every few months. Finally, the general physician may play the greatest part in reducing to a minimum the number of relapses by close supervision of working hours and working conditions, and by recognizing the seriousness of adverse home conditions, with surrounding poor hygiene. His active part as intimate adviser of the family in pointing out these hazards and suggesting methods of diminishing them should have the most profound influence in the avoidance of future breakdowns.

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(See page 120 for Preliminary Report)

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The Chemotherapy of the Pneumonias *

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The chemotherapy of the pneumonias at present resolves itself into a study of the sulfanilamide compounds. After a diagnosis of pneumonia is made, whether lobar or lobular, it is important to determine, if possible, the bacteriological background. This is done for two main reasons; first, to ascertain which one of the sulfur-benzene compounds to select and, second, to have specific serum available if the drug fails. As for anti-pneumococcus serum, we have employed it immediately in conjunction with the drug in all cases exhibiting positive blood cultures and severe toxemia. Sulfanilamide or neoprontosil seem most effective in streptococcal infections, sulfapyridine in pneumococcal diseases and a comparatively recent addition to our therapeutic armamentarium, sulfamethylthiazol in staphylococcal pneumonias. Virus infections of the pulmonary system seem resistant to all these chemotherapeutic agents. If the disease is of unknown etiology, of a rarer nature, or there is a mixed bacterial flora, it is worthwhile trying sulfapyridine first.

Before going into further detail, it seems fitting to briefly present a historical review. For many decades physicians had been using quinine and, if one notes the related chemical structure, perhaps the favorable reports of this drug are understandable. At the monthly meeting of the Dusseldorf Dermatological Society in May, 1933, Dr. Foerster [1] introduced, with a few brief remarks, the chemotherapeutic agent which was to be known as prontosil and regarded by many observers as the greatest therapeutic discovery in modern medicine. It is interesting to note that although a remedy against streptococci, it was first used in staphylococcal infections. The entire story is absorbing. In 1908, Gelmo [2] synthesized para amino benzene sulfonamide and soon similar preparations were used to develop dyes for textile purposes; for these preparations were distinguished by greater fastness in washing and milling than sulfonamide free products. In 1913, Eisenberg [3] noted that the dye was bactericidal in vitro. Then there was a real gap before this knowledge was utilized and clinical trials employed. After Foerster's remarks in 1933, several reports were offered, but no scientific experimental data relating to prontosil had been presented. However, in the February 15, 1935 issue of the *Deutsche Medizinische Wochenschrift,* Gerhard Domagk [4] forwarded an epoch-making communication, stating that prontosil, a relatively non-toxic red-dye, when given by mouth in small doses, prevented the evolution of the otherwise fatal hemolytic streptococcal infections in mice, controlled and cured chronic streptococcal infections in rabbits, and favorably influenced the course of staphylococcal infections in rabbits, but that the drug was without effect in the treatment of certain pneumococcal and other experimental infections. Soon Levaditi and Vaisman [5] of France employed the drug, confirming Domagk's work. English interest in the German investigations dates from March, 1935, with clinical trials on patients suffering from puerperal sepsis. American interest in and knowledge of the new chemotherapeutic compounds lagged well behind that of Europe and they were first used by Dr. Ashley Weech at the Babies' Hospital in New York City, July, 1935. Now the interest in America is keen and ardent and rapid strides have been made. Many new and related compounds are being synthesized and given clinical trials. It is interesting to note the inter-related chemical structures of the various derivatives.

In general, it may be said that a great proportion of the drug is absorbed in the gastro-intestinal tract and distributed through the blood stream to all parts of the body. Part of the drug is found in the blood in a free state and part is conjugated by the liver to form the acetylated compound. Chemical levels closely approximating blood levels may be noted in spinal fluid, pleural exudates and other body fluids. The drug is excreted chiefly in the urine. Sulfapyri-

* Presented before the Hunterdon County Medical Society of New Jersey, January 23, 1940.

dine is more capricious and irregular than other allied drugs in these respects.

So far, although several theories, notably those of Levaditi and Lockwood [6], have been offered, none adequately explains the mode of action of these sulfur-benzene derivatives. Long and Bliss [7] feel that for the time being, one must be content with the simple conception that they inhibit the growth of susceptible micro-organisms in the body and in the test tube.

The dosage of the drug varies with the age and weight of the patient and the severity of the disease. For the streptococcal infections of moderate severity sulfanilamide, 15 grains every four hours, day and night may be given for the average adult weighing 150 pounds. The patient is gradually weaned from the drug, when the temperature reaches an approximately normal level. A blood level of 4-8 milligrams per cent is attained. For severe illness, one may give an initial dose of .50-75 grains and maintenance doses of 20 grains every four hours. If the parenteral route, subcutaneous or intramuscular, is selected because of expediency or gastro-intestinal upsets, then neoprontosil, 50-60 cc. of 5 per cent solution, may be used daily for a severely ill patient (about ½ cc. per pound of body weight, up to 120 pounds). Patients receiving neoprontosil will have orange or pinkish discoloration of the skin, excretions and secretions. This will disappear after the drug is stopped.

Sulrapyridine, of course, is the drug par excellence in pneumonia. It comes in powdered form or .5 gram tablets. In infants and children, the dosage is .10, .15, .20 grams per kilogram of body weight, depending on the severity of the illness. In the average adult, the dose is 2 grams initially and 1 gram every four hours thereafter. However, in more severe cases, to attain a higher blood level, larger doses may be given. It is not necessary to give sodium bicarbonate with this drug, as is the usual routine with sulfanilamide. Sulfapyridine may be given rectally with sodium bicarbonate and water when vomiting is present. There is also a sodium salt for intravenous use.

It is well to mention here the latest addition, sulfamethylthiazol—believed to be most effective of all in staphylococcal pneumonias. Two grams of powder are prescribed in condensed milk every two hours for three doses; then 1.5 grams every two hours for three doses; and, finally, 1 gram every four hours. A soluble solution for intravenous usage is now being prepared.

Auxiliary treatment consist of proper diet, proper fluid intake, transfusions, surgical treatment when necessary, and almost any other essential drug. Saline purgatives are avoided as a rule.

The effects of these drugs have been truly remarkable and, in general, it may be stated that they have shortened the duration of the illness and lowered the mortality rate. Statistics cannot be properly analyzed and it is still controversial as to whether or not there are fewer complications, especially empyema. We have noted repeatedly precipitate declines in temperature and pulse rate. This has been true of cases of bacteremia, as well as in those whose blood cultures were sterile. Sometimes, the decline is more gradual. Because of the relatively low cost and availability of this drug, its usage has been wide spread and it has greatly superceded serum therapy, which has a higher cost and requires accurate typing centers.

Toxic manifestations attendant upon the usage of these drugs must be recognized. The following are the more important:

1. *Nervous system:* Headache, tinnitus, vertigo, somnolence, mental despression, peripheral neuritis may be present. Gastro-intestinal disturbances, especially anorexia, nausea and vomiting must be listed here, because it is believed that they are chiefly of central origin. Nicotinic acid may be used to combat this syndrome.

2. *Cyanosis:* This has been attributed to both sulfhemoglobinemia and methemoglobinemia. However, the theory of Marshall and Walzl [8] that a pigment discoloring the red cells produces the cyanotic tinge, seems more plausible. Methemoglobinemia may be treated with methylene blue.

3. *Acidosis:* This is more commonly found with sulfanilamide and may be counteracted with sodium bicarbonate.

4. *Fever:* More than five per cent of cases reveal a secondary rise, due to the drug. However, occasionally it may be a more ominous sign, pointing to a blood dyschrasia or

a complication.

5. Depression of spermatogenesis has been reported.

Thus far, except for peripheral neuritis, no indication for stopping the drug has been mentioned. However, the drug must be discontinued under the conditions to be mentioned:

6. *Disturbances of the white cells.* Neutropenia or frank agranulocytosis can occur and fatalities have been reported.

7. *Disturbances of the red cells.* Mild to severe anemias, including acute hemolytic anemia can occur. It is not uncommon to find a hyperleukocytosis with these conditions. It is well to mention that in agranulocytosis and acute hemolytic anemia, daily blood transfusions are essential.

8. Renal irritation with hematuria and hepatitis are uncommon. However, renal calculi and other urinary stones may occur with sulfapyridine.

9. *Dermatitis.* Angioneurotic edema, purpura, urticaria, erythema and morbilliform rashes have been reported. Whether or not the drug should be stopped is controversial, but its continuance should be weighed against the severity of the illness.

The only real contra-indication to the institution of the derivatives is a previous history of drug toxicity. Because of the various factors involved, a complete daily work-up of the case should include a blood count, urine analysis, blood pressure readings, blood chemical levels, and a recording of the intake and output of fluids. The value of the drug has been discussed, but it is also important to stress the misuse. It should not be employed in colds, grippes, and numerous other infections, unless the indication is definite. It can be said that we not only have a widely used drug, but also a frequently abused preparation.

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The Value of the Tuberculin Skin Test in Early Diagnosis of Tuberculosis

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The infectious nature of tuberculosis has been known for more than fifty years; still the percentage of advanced cases admitted to sanatoria continues high. There has been too much waiting and hoping for a specific cure. While great strides have been made with collapse therapy, tuberculosis continues its insidious destruction.

Tuberculosis is a preventable disease. How can the number of advanced cases be reduced? Without a specific cure, there is one remaining hope: *Preventive Medicine*. Here indeed is a challenge to the medical profession. Discovering and treating tuberculosis in the minimal stage is, in a sense, practicing preventive medicine, because a cure in the advanced stage is somewhat problematical.

The tuberculin skin test sifts out infected individuals like a super magnet drawing a needle out of a haystack. Except for roentgen examination, it is the only method of today which makes known the presence of tuberculosis before clinical observations can be made.

In office practice, the intra-dermal skin test with Tuberculin P.P.D. (purified protein derivative) should be the method of choice, as it is made up fresh when wanted and can be given in accurately measured doses. This does away with the fear of severe reactions in hypersensitive individuals and also nonspecific results from too old a tuberculin. Finding a positive reactor, necessitates the

* Herman Kiefer Hospital.

taking of a chest x-ray, without which the presence of active tuberculosis cannot be ruled out.

Positive reactors who are found to have demonstrable healed or primary lesions, should be x-rayed yearly. Positive reactors with negative plates, who were known to have been close contacts, should be x-rayed every three months the first year, and yearly thereafter for at least five years.

An attempt was made to determine the most successful procedure in making an early diagnosis. Accordingly, five thousand case histories of tuberculosis were reviewed. From this study, the most striking fact was the apparent indifference of the general public to the seriousness of a persistent cough. The people must be made cough conscious, if much headway is to be made in the eradication of this disease. The dry, hacking cough was the earliest objective symptom mentioned, and was noted in virtually all the moderately and far-advanced cases.

The time interval between onset of cough and diagnosis averaged from three to six months in moderately advanced cases and from eight to fifteen months in far advanced cases.

These patients did not seek medical advice purely because of cough. Only the development of a catarrhal episode or hemoptysis caused them to seek medical advice. It was interesting to note in this connection that a great many of the minimal and moderately advanced cases were diagnosed early because hemoptysis occurred relatively early and alarmed the patient sufficiently to seek medical aid. Also, the percentage of hemoptysis in the entire series (19 per cent) is slightly lower than that seen in tuberculosis generally, since, in many cases, hemoptysis does not occur until after the patient enters the sanatorium.

Frequently, cough was the only symptom by which the clinical onset of the disease could be traced. Unfortunately, the cough cannot be used as a criterion for early diagnosis. The very nature of the cough mechanism infers that an exudate is present in the bronchial tree. When a parenchymal lesion develops and undergoes caseation or ulceration, the disease may already have obtained a firm foothold. Actually, the very earliest symptoms are subjective, being due entirely to the tuberculous toxin and its allergic manifestations.

When one first inhales the tubercle bacillus, it usually lodges somewhere in the upper third of either lung. At this point, one of two things occurs: Either a small tubercle develops in the parenchyma, or the organism is carried by the lymphatics to the deep glands of the chest. The healed tubercle becomes encapsulated and eventually calcified.

The parenchymal lesion may be so small and so situated that it will not cast a shadow on the x-ray plate. Frequently, the initial parenchymal lesion is large enough to be seen and will vary in size from 0.25 cm. to 1.0 cm. This is termed the primary lesion or infection and is disregarded by x-ray men when reading chest films. However, this primary lesion should not be confused with a minimal lesion. Here, the area of density may also be about a cm. in size, but will not be calcified. The small area of density will not have sharply defined borders, but will seem to fade off into the parenchyma of the lung.

These so called spots may be found in any part of the lung, but more commonly in the apex or infraclavicular region. There may be several of these areas of density in a minimal lesion providing the sum total of their area does not cover more lung than is included in an area extending from the apex of one lung to its second chrondrosternal junction. The toxin produced by such a small lesion is not sufficient to cause any noticeable symptoms.

One having such a small lesion can go about his daily routine unsuspectingly, until he goes through a period of physical strain, at which time his body resistance is lowered. The minimal lesion which was formerly quiescent, but not healed, caseates and bacilli are spilled into the adjacent bronchioles or are disseminated by the lympho-hematogenous route. Contiguous infiltrations develop, coalesce, and in time involve a large area of lung. The increased amount of toxin first manifests itself by sensations of fatigue, anorexia, and increased irritability. The characteristic of the fatigue is that while it seems to dis-

appear with rest it returns immediately with the slightest amount of work or exercise.

The anorexia first takes the form of aversions to various foods, and later, to a marked loss of appetite. A common complaint among advanced cases was that they had always been finicky about their meals. Increased irritability first manifests itself by the person becoming irked and annoyed with petty occurrences, which were formerly unnoticed. These mild subjective symptoms are not productive of many voluntary physical examinations.

The number of cases having the common insidious course of a pulmonary tuberculosis was 73 per cent. In this group, the minimal cases were 8 per cent; moderately advanced cases were 32 per cent; and far advanced cases, 60 per cent. Twenty-four per cent of the group studied had a so-called catarrhal onset. Although this was a small percentage, it gains its importance from the fact that practically all the errors in diagnosis were limited to this group. Colds, bronchitis, "Flu," and pneumonia led the list of diagnoses made. These catarrhal episodes are often repeated several times before the patient finally de- the group studied had a so-called catharrhal

Many patients call these attacks colds, but in reality they are the result of new areas of infiltrations developing in the manner already described. Definite support of this is found in the appearance of chest films from all advanced cases. These show a mixed type of lesion in various stages of development. The period in which the minimal lesion developed was missed entirely. When the new area of infiltration is small, or if the allergic manifestations are mild, recovery takes place spontaneously, with only a loss of a few days or weeks. Unfortunately, the new infiltrations do not clear completely before other episodes take place.

Invariably, the tendency to improve after a few weeks in bed produces a false sense of security. Patients return to work with their general health at a lower level, but sufficient to carry on the daily routine. Many far-advanced cases had several recurrent supposed attacks of "flu" and rarely was a follow-up x-ray made.

Pleurisy with effusion frequently was diagnosed as pneumonia. These cases had a rather acute onset of fever, malaise, cough, and shortness of breath. Pleurisy which was usually present before onset of fever would disappear following the formation of fluid. Flatness and absent to feeble breath sounds on the affected side are usually present. A careful history will aid in diagnosis, as many of these cases have an associated pulmonary lesion, or a history of contact.

Gastro-intestinal symptoms as the chief complaint, occurred in only a little more than two per cent of the cases. Diagnosis is not difficult if a chest plate is made in all doubtful cases. Appendicitis, gastric ulcer and gall bladder disease are most frequently confused with the symptoms of tuberculous enteritis or peritonitis.

In summing up the review, it is found that the persistent productive cough and the repeated catarrhal episodes were the main reasons for medical advice being sought. However, as was previously stated, these symptoms did not aid in diagnosing early cases. Every minimal case was missed unless it happened to be a known contact, or hemoptysis occurred. Hemoptysis was the initial symptom in only 1.5 per cent of all the cases, so it cannot be used as a criterion for early diagnosis.

From the history and x-ray findings it seems logical to assume that the great majority of advanced cases are due to a reinfection from within. That is, a breakdown of a partially healed primary lesion, or a sudden spread of a minimal lesion, which had been quiescent, but not healed. A tuberculin skin test months or even years before would have shown the presence of tuberculosis, before advanced activity developed.

As the medical profession becomes more tuberculosis-minded, more cases will be discovered before they have had a chance to infect others. Consequently, the percentage of positive reactors becomes smaller as the years go by. The time has come when a tuberculin skin test must be included in all differential diagnostic procedures.

Organization News

Program—Monday, June 10, 1940

AMERICAN COLLEGE OF CHEST PHYSICIANS

Sixth Annual Meeting **New York City**

MORNING CLINIC SESSIONS

Lenox Hospital—9:00 A.M. to 11:00 A.M.

Medico-Surgical Clinic:
Dr. Carl Eggers
Dr. John C. Gerster
Dr. Otto C. Pickhardt
Dr. H. McLeod Riggins
Dr. Dewitt Stetten
Dr. Grant Thorburn

Kings County Hospital—9:00 A.M. to 11:00 A.M.

1. "Primary Infection Tuberculosis"
   Dr. Frederick Bridge
2. "Early Manifestations of Pulmonary Tuberculosis"
   Dr. Milton Louria
3. "Bilateral Pneumothorax Therapy"
   Dr. Harry Reibstein
4. Clinical Case Reports:

   A. "Early Diagnosis of Pulmonary Neoplasms"
   Dr. Ralph Romano

   B. "A Case of Blastomycosis"
   Dr. Jacob Rogoff

   C. "A Case of Pulmonary Tuberculosis Complicated by Hyperthyroidism"
   Dr. William Wagman

   D. "Unusual Lung Abscesses"
   Dr. Peter Amazon

   E. "Becks Sarcoid and Miliary Tuberculosis"
   Dr. Ida Levine

   F. "Pulmonary Neoplasms Associated with Pulmonary Tuberculosis"
   Dr. Abraham Bolker

   G. "Pneumothorax Therapy Followed by Acute Miliary Spread"
   Dr. Vincent Lacavara

   H. "A Case of Hypertension Followed by Addison's Disease"
   Dr. Sol Brandwein

Montefiore Hospital—11:00 A.M. to 1:00 P.M.

"Diagnostic Significance of Sputum Findings"
Dr. Pinner—20 minutes

"Demonstration of Respiratory Tests and Bronchospirometry"
Drs. Leiner, Weiss, and Zavod—30 minutes

"Pulmonary Abscess"
Dr. Rosenblatt—20 minutes

"Presentation of Surgical Problems"
Dr. Aufses—15 minutes

"Bronchial Tuberculosis"
Dr. Cohen—15 minutes

"Hematogenous Tuberculosis"
Dr. Rubin—15 minutes

AFTERNOON CLINIC SESSIONS

Sea View Hospital—2:30 P.M. to 4:30 P.M.

"Indications and Results of Cannulation of Giant Tuberculous Pulmonary Cavities"

"Demonstration of the Surgical Procedure"

Drs. Louis R. Davidson and George G. Ornstein

Bellevue Hospital—2:30 P.M. to 4:30 P.M.

"Clinical Problems in Thoracic Disease"
Drs. Andrain Lambert, J. Burns Amberson, Jr., and Frank Berry

Kingston Avenue Hospital—2:30 P.M. to 4:30 P.M.

"Tuberculosis Clinic—Evaluation of Diagnosis and Service to Patients from Time of Admission and During Their Stay at the Hospital"
Dr. Foster Murray

Now On the Press

1940

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"Information Please" Luncheons

Seated at the head table of the "Information Please" Luncheons will be the following experts in the indicated specialties:

Please address all questions to the office of Dr. Edward P. Eglee, Chairman, 105 East 53rd Street, New York, New York.

Biltmore Hotel — Saturday, June 8, 1940

Medicine

Dr. James Alexander Miller
New York, New York

Surgery

Dr. Ralph C. Matson
Portland, Oregon

Bacteriology

Dr. S. A. Petroff
Staten Island, New York

Physiology

Dr. Dennison Richards

Bronchoscopy

Dr. John D. Kernen
New York, New York

X-Ray

Dr. Maurice McPhedran
Philadelphia, Pennsylvania

Pathology

Dr. Henry C. Sweany
Chicago, Illinois

Biltmore Hotel — Sunday, June 9, 1940

Medicine

Dr. Carl R. Howson
Los Angeles, California

Surgery

Dr. Richard Overholt
Boston, Massachusetts

Bacteriology

Dr. S. A. Petroff
Staten Island, New York

Physiology

Dr. Andre Cournand
New York, New York

Bronchoscopy

Dr. Mervin C. Myerson
Brooklyn, New York

X-Ray

Dr. H. L. Sampson
Saranac Lake, New York

Pathology

Dr. Henry C. Sweany
Chicago, Illinois

DISTRICT MEETINGS OF FELLOWS OF THE COLLEGE

Dr. Harry Warren, Chairman of the Sanatorium Committee of the College, and Dr. William C. Voorsanger, Governor of the College for California, arranged for a meeting of the Fellows of the College at San Francisco on March 8, 1940. Guests were invited.

Murray Kornfeld, Executive Secretary of the College, gave a report on the progress made by the College to date and extended an invitation to the Fellows in the Bay District, through the Chairman of the Board of Regents, to attend the Annual meeting of the College to be held at New York City in June.

Dr. Chesley Bush, past president of the National Tuberculosis Association, and Mr. Ward Higby, Executive Secretary of the California Tuberculosis Association, attended the meeting.

Dr. Ralph C. Matson, President of the American College of Chest Physicians, presided at a meeting of the Fellows of the College from the State of Oregon held on March 11th, at Portland, Oregon. Mr. Murray Kornfeld, Executive Secretary of the College, reported on College activities, and the work of the College was heartily endorsed by the Fellows present.

Oregon's new teaching center for diseases of the chest was inspected by Mr. Kornfed and he reports that it is an institution of which the State of Oregon can well be proud. Every facility for the postgraduate teaching of chest diseases is available at the hospital, which is connected with the University of Oregon Medical

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MODERATE RATES

Descriptive Booklet on Request

MEDICAL DIRECTORS
Ralph C. Matson, M.D., & Marr Bisaillon, M.D.
1004 Stevens Building Portland, Oregon

School, and two Fellows of the College are now taking postgraduate work at the hospital. Dr. Matson is the Medical Director of the new hospital.

CORRECTIONS

It has been called to our attention that the spelling of Dr. Jaharlal Ghosh's name, published in the November, 1939 issue of DISEASES OF THE CHEST, and that of Dr. Donato G. Alarcon's name, published in the March, 1940 issue of DISEASES OF THE CHEST, were incorrect. The above spellings are correct.

NEW FELLOWS OF THE COLLEGE

The following physicians have been admitted as Fellows of the College during the months of December, January, February and March:

Dr. Leslie P. Anderson, Elma, Washington

Dr. Indubhusan Basu, Calcutta, India

Dr. James Shields Conant, Portland, Oregon

Dr. Jules Myron Davidson, New Orleans, Louisiana

Dr. Everett Cato Drash, Charlottesville, Virginia

Dr. Israel George Epstein, Brooklyn, New York

Dr. M. James Fine, Newark, New Jersey

Dr. Alvis Eugene Greer, Houston, Texas

Dr. Joseph Hartman, New York, New York

Dr. Leon Hughes Hetherington, Pittsburgh, Pennsylvania

Dr. James V. Jaso, South Orange, New Jersey

Dr. A. Holmes Johnson, Kodiak, Alaska

Dr. Israel Kahalas, Boston, Massachusetts

Dr. Edwin Rayner Levine, New York, New York

Dr. Shu-Fan Li, Hong Kong, China

Dr. William Paul Maddux, Mount Vernon, Missouri

Dr. Savere F. Madonna, Philadelphia, Pennsylvania

Dr. Antonio Navarrete, Havana, Cuba

Dr. B. C. Roy, Calcutta, India

Dr. Martin Lee Stephensen, Jr., Sanatorium, Texas

Dr. Emanuel Milton Weinberger, Philadelphia, Pennsylvania

Dr. Irving Willner, Newark, New Jersey

STATE TUBERCULOSIS MEETING

The California State Tuberculosis Association will meet in Santa Barbara, California, April 11-13, 1940. For further information write to Mr. Ward F. Higby, Executive Secretary of the California Tuberculosis Association, San Francisco, California.

TUBERCULOSIS COMMITTEE ACTS AS CLEARING HOUSE

The Annual luncheon sponsored by the Tuberculosis Committee of the Texas State Medical Association will be held on Tuesday, May 14th, at the Baker Hotel, Dallas, during the meeting of the Texas State Medical Association. Dr. R. B. Homan, Sr., is the Chairman of the Tuberculosis Committee and Dr. H. Frank Carman, Regent of the College for the State of Texas, will preside at the luncheon.

These luncheons were inaugurated last year at San Antonio to act as a clearing house for state problems in tuberculosis. Representatives from various interested organizations, such as the state tuberculosis association, the state public health group, etc., are invited to attend and actively participate in the discussions.

A further report on this luncheon will appear in these columns.

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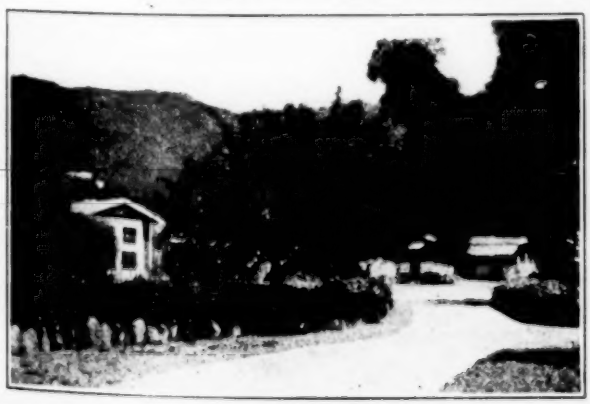

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PENNSYLVANIA TUBERCULOSIS SOCIETY OFFERS SCHOLARSHIP

For the third successive year, the Pennsylvania Tuberculosis Society is offering a scholarship of $300.00 for postgraduate study at the Trudeau School of Tuberculosis, Saranac Lake, New York. The scholarship is open only to Pennsylvania physicians and preference will be given to a physician engaged in the private practice of medicine and resident in a small or rural community who has not had special training or experience in tuberculosis.

Applications and inquiries for further information should be forwarded at once to the Pennsylvania Tuberculosis Society, 311 South Juniper Street, Philadelphia, Pennsylvania.

ADDRESSES BY FELLOWS

Dr. Jay Arthur Myers, Regent of the College for regional district number 9, addressed a joint meeting of the Chicago Pediatric Society and the Chicago Tuberculosis Society on March 19th. The subject of his talk was the *Relationship of First Infection to Clinical Tuberculosis.*

Dr. George E. Martin, Fellow of the College, spoke before the March 19th meeting of the Allegheny County Medical Society on the *Trend of Tuberculosis in Pittsburgh.*

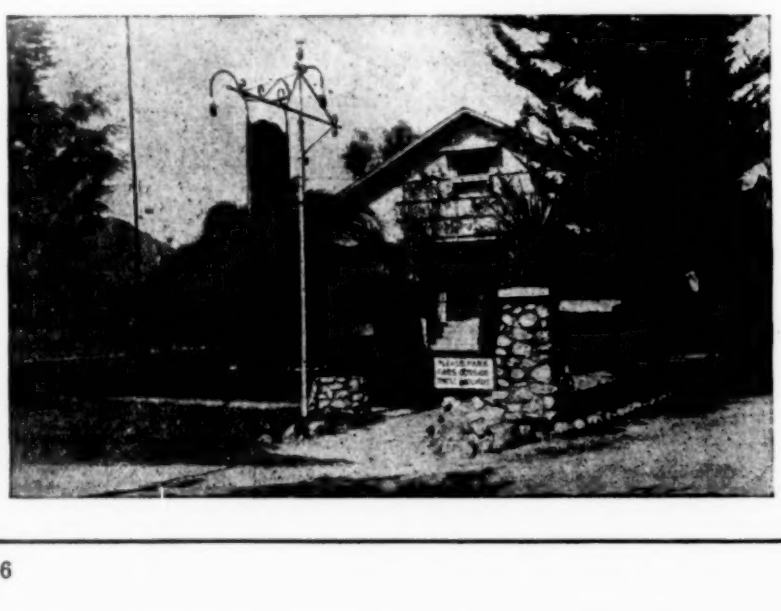
On January 9, 1940, Dr. Miguel Canizares, Governor of the College for the Philippine Islands, spoke before the Manila Medical Society, of which he is the retiring president.

Dr. Chevalier J. Jackson, Philadelphia, Pennsylvania, a Fellow of the College, addressed the Trudeau Society of Boston on January 25th. The subject of his talk was *Bronchoscopy in the Treatment of Thoracic Disease.*

PRIZES OFFERED FOR SCIENTIFIC RESEARCH

A prize of $250 for work in thoracic surgery is being offered by the Rose Lampert Graff Foundation of Los Angeles through the American Association for Thoracic Surgery. Further information can be obtained from Dr. Richard H. Meade, Jr., 2116 Pine Street, Philadelphia, Pennsylvania.

The Leon Bernard prize of 2,500 French francs is being offered by the International Union Against Tuberculosis. Information is available through the National Tuberculosis Association, 50 West 50th Street, New York City.



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